

**Safety....The NASA Family....Excellence....Integrity**

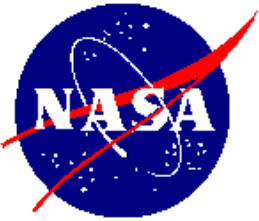
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# **NASA Safety and Mission Assurance Requirements Management and Development Compliance Verification Workshop**

**September 14-16, 2004**

**Presented by: Dr. Michael Stamatelatos  
Wilson Harkins  
John Lyver**

Office of Safety and Mission Assurance  
Safety and Assurance Requirements Division



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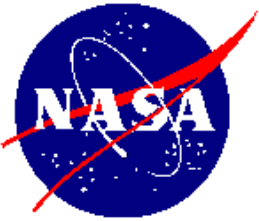
## **Requirements Philosophy and Objectives**

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- **It is NASA policy to identify and promulgate NASA internal requirements where necessary to fulfill the Agency's vision, mission, and external mandates. (Draft NPD 1400.1I)**
- **Written requirements establish the baseline for:**
  - **Performing activities**
  - **Measuring compliance and effectiveness of that performance**
- **Written requirements also:**
  - **Capture and disseminate corporate knowledge**
  - **Codify lessons learned**

## **Verba Volent – Scripta Manent**

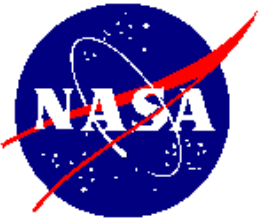
**(What is spoken flies – What is written remains)**



## To Do and not to Do

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- The purpose of this meeting is to
  - Clarify how we will verify compliance to NASA policies/requirements
  - Examine ways to facilitate the review/audit process
- The purpose of this meeting is NOT to
  - Modify or revise the contents or language of the requirements
  - Reduce the number of or eliminate requirements
- There will be other opportunities improve the existing requirements

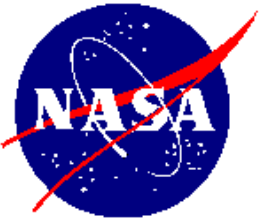


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## **Requirements Philosophy and Objectives**

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- **Within Safety and Mission Assurance, it is not an exaggeration to say that all of our activities are based on written requirements**
- **If requirements are one of the primary tools used to assist in accomplishing NASA's safety and mission assurance function, then it is essential that our requirements are:**
  - **Comprehensive**
  - **Clear**
  - **Concise**
  - **Sufficient (not overly prescriptive)**
  - **Verifiable**
  - **Singular in existence**

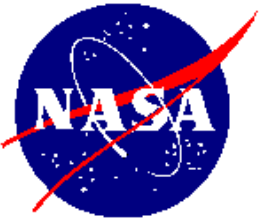


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## **Requirements Philosophy and Objectives**

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- **Within the Safety and Assurance Requirements Division our aim is to meet these objectives.**
- **But, we can't meet these objectives alone.**
- **We depend upon:**
  - **Subject matter experts to assist in developing the draft requirements**
  - **Requirements reviewers (both formal and informal) to challenge the requirements we write**
  - **Requirements users to identify problems/concerns with implementing the requirements**
  - **Compliance verification teams to identify cases where changes might be required to the requirements**

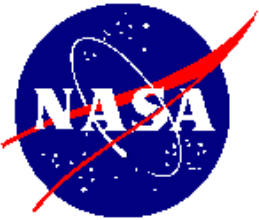


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## **Requirements Status – NASA Internal Rules Review**

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- **Initiated December 2003**
- **Mandates:**
  - **Convert all NPGs to NPRs**
  - **All NASA Directives contain only requirements, no guidance**
- **Rules Review Activities**
  - **Inventory all rules (Complete at HQ – ongoing at Centers)**
  - **Directives scrub to remove guidance and retain only requirements (“Complete” at HQ – ongoing at Centers)**
  - **Directives updates to ensure consistent content and structure with respect to defining and documenting requirements (Ongoing at HQ – TBD for Centers)**
    - **Entails revisions to NASA Internal Rules Requirements Documents**
    - **Subsequent implementation of the revised NASA Internal Rules Requirements Documents**



## **Requirements Status – NASA Internal Rules Review**

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- **Topics Under Discussion for Revised Agency-level “Rules to Make Rules”**
  - **Define relationship and precedence with other NASA Internal Rules (Directives, Standards, Work Instructions, etc.)**
  - **Establish a hierarchy of directives**
  - **Establish a formal class of documents called Interim Directives**
  - **Clearly define what constitutes a “requirement”**
  - **Define verification requirements**
  - **Clearly define measurement requirements**
  - **Define process for evaluation and approval of variances (waivers/deviations) to requirements**

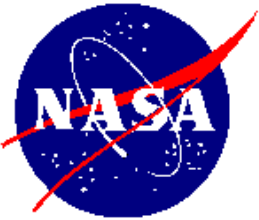


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## **Requirements Status – NASA Internal Rules Review**

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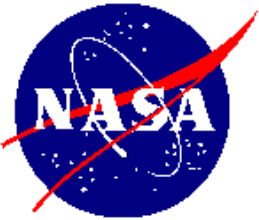
- **All OSMA directives were reviewed**
  - **Identified all requirement statements with a unique database tracking number (Safety and Mission Assurance Requirements Tracking System [SMARTS])**
  - **Eliminated some redundant requirements and one redundant directive (NPD 8621.1)**
  - **Made various administrative changes (office names, etc.)**



## **Requirements Status – NASA Internal Rules Review**

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- **Future Work**
  - **Perform a more complete review of all OSMA Requirements Documents**
    - **Revise to reflect new “Rules to Make Rules”**
    - **Revisit all of the out-of-scope comments received from the initial portions of the Internal Rules Review**
      - **Content updates**
      - **Requirement validity challenges**
      - **Content clarifications**
    - **Clearly differentiate between directives and standards**
      - **Roles and responsibilities in directives**
      - **Clearly designate which standards are mandatory by explicit citations within appropriate directives**



## **Requirements Status – NASA Internal Rules Review**

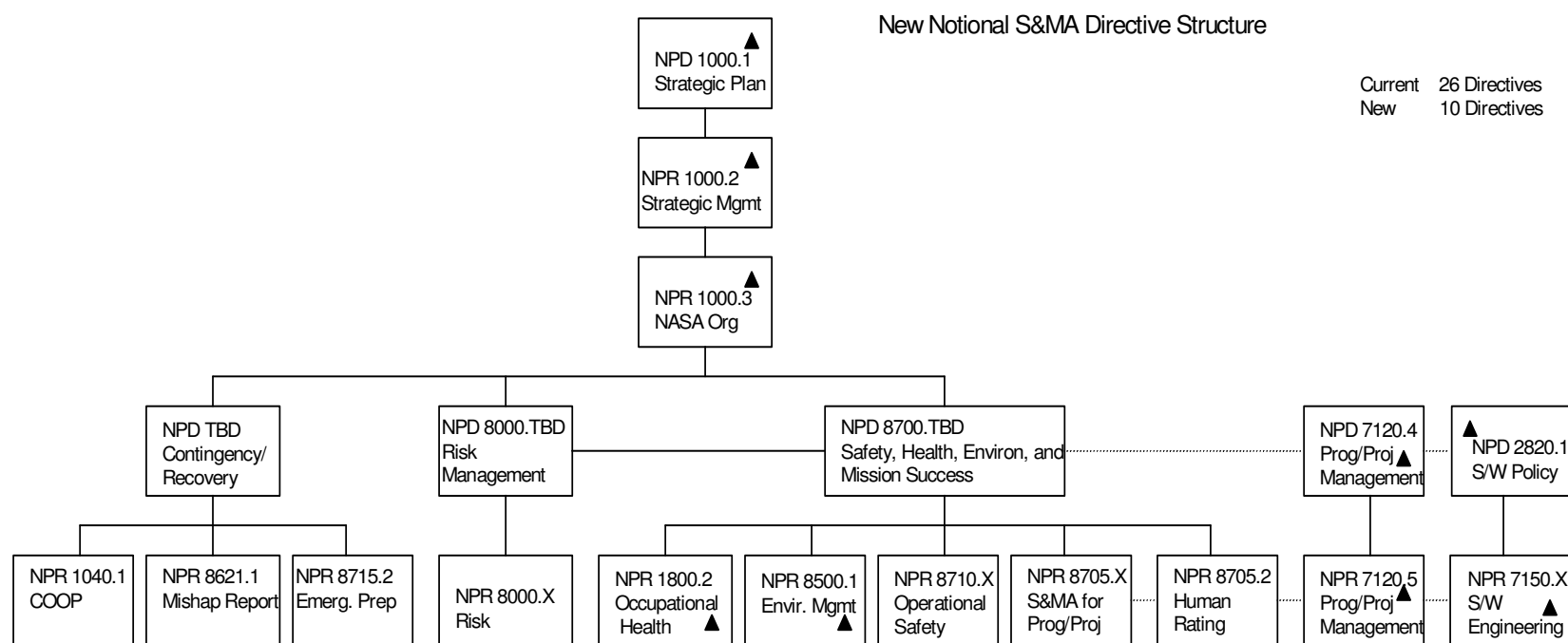
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- **Future Work (continued)**
  - **Perform a more complete review of all OSMA Requirements Documents**
    - **Eliminate duplication of requirements and documents**
      - **Combine or eliminate documents where appropriate**
        - **Eliminate un-needed NPD/NPR pairs**
      - **Combine or eliminate requirements where appropriate**
        - **Add appropriate cross-references**
      - **Rule will be to state a requirement only once**
        - **Use responsibility matrices vice restating responsibilities as separate requirements**
    - **Utilize capabilities of SMARTS**

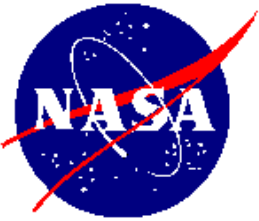


## Requirements Status – NASA Internal Rules Review

- Future Work (Notional OSMA Directives Tree)



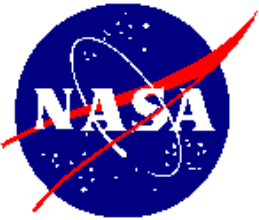
▲ Not an OSMA Directive



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## **What is the Safety and Mission Assurance Requirements Tracking System (SMARTS)?**

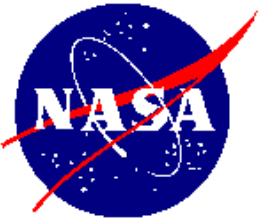
- SMARTS is being implemented to make it easier to understand, track, and implement NASA's SMA requirements.
- SMARTS is an internet-based information system designed to:
  - Collect all SMA policy and procedural requirements at the Agency and Center levels and from appropriate sources external to NASA
  - Provide a means to filter, collect, search, and sort requirements into “personalized virtual” documents to meet specific needs
    - Whole documents/Partial Documents
    - Requirements lists
    - Compliance Verification Documents
  - Support the data associated with the verification of compliance to SMA requirements
  - Support maintenance and development of new SMA policy and implementation documents/requirements
  - Trace links to SMA requirements to improve effectiveness and limit duplication of requirements



## **Status of SMARTS**

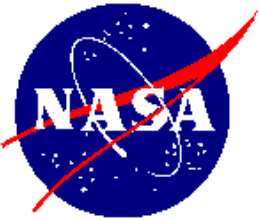
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- **SMARTS version beta 1.0 is now available for use throughout NASA via the internet.**
- **SMARTS is accessed using a web browser.**
- **SMARTS requires a user account and password for access.**
- **SMARTS' security levels match/exceed those used in NODIS.**
  - **Most of NODIS is available without ID and Password**
  - **NODIS checks user's domain to determine access to NASA only documents such as NPR 1040.4 (COOP)**
  - **SMARTS will have various user types to allow write access to various data fields (such as the requirements statements, verification information)**



## **What is Currently in SMARTS?**

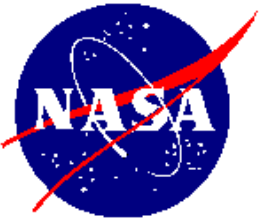
- **42 documents: 17 NPDs, 15 NPRs, OSMA Functional Leadership Plan, 2 NASA-STDs, 4 Presidential Decision Directives, 1 Executive Order, and the NASA FAR Supplement SMA sections and 29 CFR 1960.**
  - **How much of the document is in SMARTS (at a minimum)?**
    - **SMA Owned documents: The entire requirements sections of the document, preface, core chapters and appendix titles. Requirements contained in appendices are also included.**
    - **Non-SMA owned NASA documents contain: SMA portions of core document and SMA appendix titles.**
    - **Non-NASA documents: SMA portions and unclassified excerpts.**
  - **All paragraph text is stored exactly as stored in NODIS (or other master library) except:**
    - **'Tags' have been added to the beginning of subsection paragraphs so that requirements read as a whole thought.**
      - **For example, 'tags' like: "The \_\_\_\_ shall –" have been added to bulleted lists so the data is more readable than the standalone bullet.**
    - **Some documents captured early in the process use "AA/SMA" and "EAA" abbreviations when the master document may have the text spelled out.**
    - **SMARTS Requirement ID Numbers may appear within SMARTS before they appear in the Master Library (NODIS, etc).**



## What's Next for SMARTS?

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- **Data Additions:**
  - Continually adding more documents and changes.
  - Next thrust will be to add SMA NASA-Standards and referenced SMA documents
- **Functional Additions planned for November 2004:**
  - Center-level document libraries
  - Expanded reporting for Compliance Verification planning and assessments
  - Expanded Document Meta-data
  - Waiver/Deviation tracking/processing
  - Expanded reporting, querying, and searching
  - Better integration with NODIS
- **Planned for 2005:**
  - Document version archiving
  - Expanded Subject Matter Expert tracking
  - Expansion of system to include Center/Program documentation

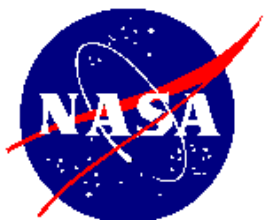


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## Accessing SMARTS

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- **Researcher User Accounts can be requested from the SMARTS login-screen or by sending an E-mail to:**  
**[JLyver@NASA.GOV](mailto:JLyver@NASA.GOV)**
- **SMARTS can be found at:**  
**<http://207.41.94.235/SMARTS>**



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### Sample Actor Report

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**Executive Director, Aerospace Safety Advisory Panel Requirements**

4 Requirements

**Document Library: NASA Agency Wide Documents**

**NPR 1000.3 - The NASA Organization w/Changes (1-59), From Library: NASA Agency Wide Documents**

Para#	Text	Auditable?
4.17.3.1	The A.A./SMA serves as an ex officio member of, and provides administrative support to, the Aerospace Safety Advisory Panel, which reports directly to the Administrator. (Requirement 3015)	No

**NPR 8715.3 - NASA Safety Manual w/Changes through Change 1, 6/19/02. (w/ch 1), From Library: NASA Agency Wide Documents**

Para#	Text	Auditable?
7.3.08	The Center Director is the primary NASA official responsible for ensuring the safe operation of all aircraft assigned to the Center, and for establishing and implementing an Aviation Safety Program tailored to the Center's aircraft/airfield operations. (Requirement 25180) They are assisted by NASA Headquarters staff assistance visits and the reports and recommendations of the IAOP and ASAP.	Yes

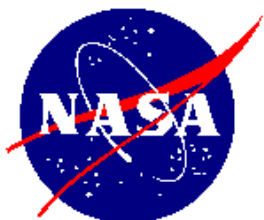
**OSMA FLP - OSMA Functional Leadership Plan, From Library: NASA Agency Wide Documents**

Para#	Text	Auditable?
2.1.b.4	The Executive Director, Aerospace Safety Advisory Panel, provides staff support for the Aerospace Safety Advisory Panel. As an independent safety review body, the mission of the Aerospace Safety Advisory Panel is to advise the NASA Administrator and Congress on all safety-related issues concerning NASA's aeronautics, robotic, and human operated space flight programs.	No
2.4.f	As an independent safety review body, the mission of the Aerospace Safety Advisory Panel (ASAP) is to advise the NASA Administrator and Congress on all safety-related issues--design, development, manufacturing, flight preparation, and missions operations--concerning NASA's human space flight programs. These issues encompass both systems and operational safety. The Panel works closely with the NASA OSMA and SMA organizations and contractors at all levels to achieve its mission.	No

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Page 1 of 1

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## Sample Compliance Verification Report

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**Audit Summary Report**

**NPD 8700.3 - Safety and Mission Assurance (SMA) Policy for NASA Spacecraft, Instruments, and Launch Services**

**Leadership & Management**

Cats.	Responsible Party	Para#	Requirement	OQE	Notes	Audit Findings
F	Enterprise AA	5.b.(3)	The Enterprise Associate Administrators who are responsible for spacecraft, instruments, and launch services shall be responsible for the following activities: Ensuring the development of risk assessment relating to the integration of the payload with the launch vehicle. (Requirement 28019)			Yes
F	Enterprise AA	5.b.(4)	The Enterprise Associate Administrators who are responsible for spacecraft, instruments, and launch services shall be responsible for the following activities: Certifying that the risks related to the success or safety of NASA spacecraft, instrument, and launch service missions have been identified, assessed, and either mitigated or accepted by the appropriate level of management. (Requirement 28020)			Yes
P	KSC Program/Project Manager, ELV Programs & Program Manager, ELV Programs (HQ)	5.c.(1)	The Launch Services Program Manager is responsible for the following activities: Ensuring the development, incorporation, and implementation of SMA and risk management requirements in KSC future and existing launch service contracts, agreements, grants, or other launch service acquisition instruments and implementing changes necessary to assure safety or mission success. (Requirement 28022)			Yes
P	KSC Program/Project Manager, ELV Programs & Program Manager, ELV Programs (HQ)	5.c.(3)	The Launch Services Program Manager is responsible for the following activities: Defining, documenting, and implementing launch service SMA and risk management requirements for each program-managed launch service, including coordination of spacecraft and instrument assurance support activities once the spacecraft and/or instrument is integrated with the launch vehicle. (Requirement 28024)			Yes
I	Center Director (Does NOT include NASA HQ)	5.e.(3)	The Center Directors who are responsible for the spacecraft and/or instruments shall be responsible for the following activities: Ensuring the incorporation of SMA and risk management requirements in spacecraft and instrument contracts, agreements, grants, or other acquisition instruments. (Requirement 28034)			Yes
I	Center Director (Does NOT include NASA HQ)	5.f	For NASA missions using launch services not managed by the KSC Launch Services Program Office, the spacecraft or instrument program or project implementation Center SMA Director, as the Center Director's agent, will coordinate spacecraft, instrument, and launch service CoFR activities with the Associate Administrator for Safety and Mission Assurance. (Requirement 28039)			Yes
	Center Director (Does NOT include NASA HQ) & Enterprise AA & HQ AA/Safety and Mission Assurance & Program Manager, ELV Programs (HQ) & Program/Project Manager	5.g	When a spacecraft or instrument does not have an assigned responsible NASA Center and/or does not use a KSC-managed launch service, the assigned Headquarters Enterprise office will be responsible for implementing this policy via the program/project manager. (Requirement 28040)			No

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